

# Dead Zones and Dirty Dishes: A Brief Case Study in United States Phosphate Regulation

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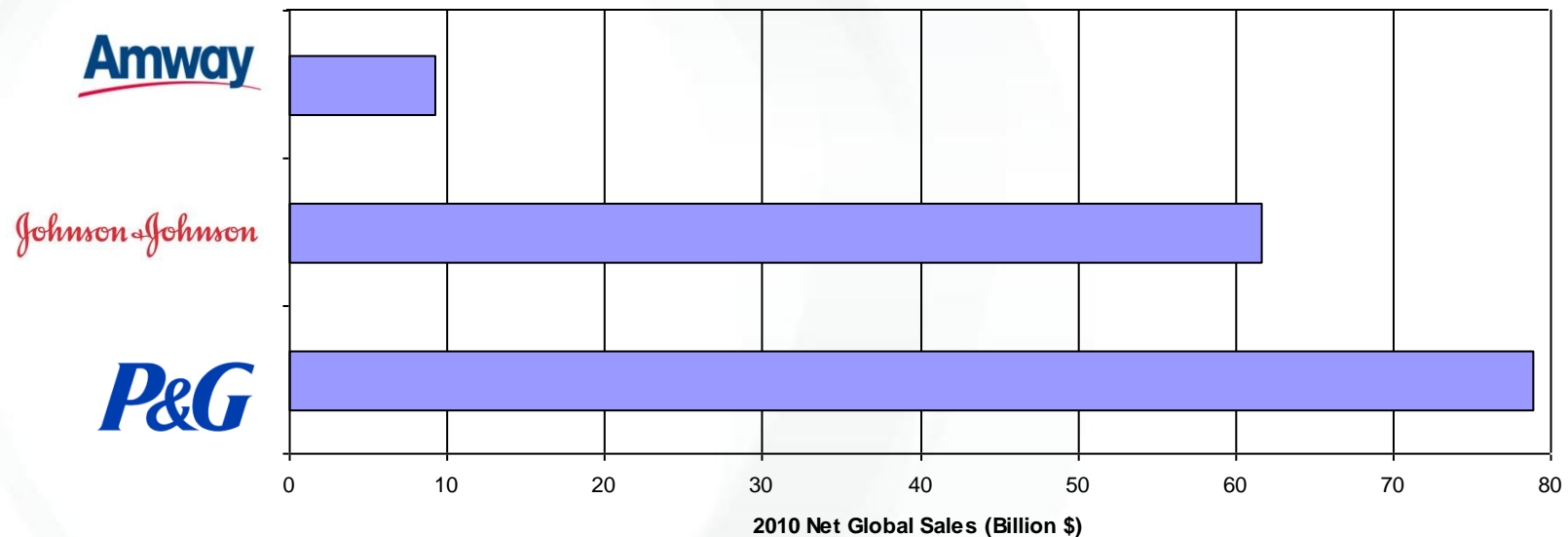
# Outline

- Introduction
  - Who is Amway?
  - Some background on phosphates
  - The history of regulation
- Why can't phosphate just be swapped out with something else?
- Primary items industry must consider
  - Safety
  - Performance
- Additional items industry must consider
  - Compatibility with machines
  - Product shelf life and package compatibility
  - Process-ability
  - Cost
- What Amway did
- Conclusions

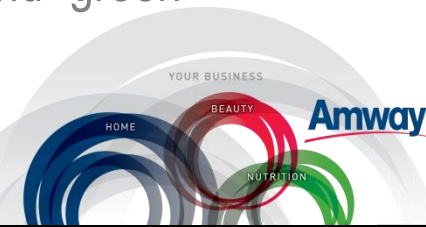


# Who is Amway?

- A modest sized global company focused on beauty products, nutritional supplements, home and personal care products and some durable goods.



- A leader in the direct selling industry with over 3,000,000 registered distributors.
- A company that takes seriously its responsibility to develop safe and “green” products for its consumers.

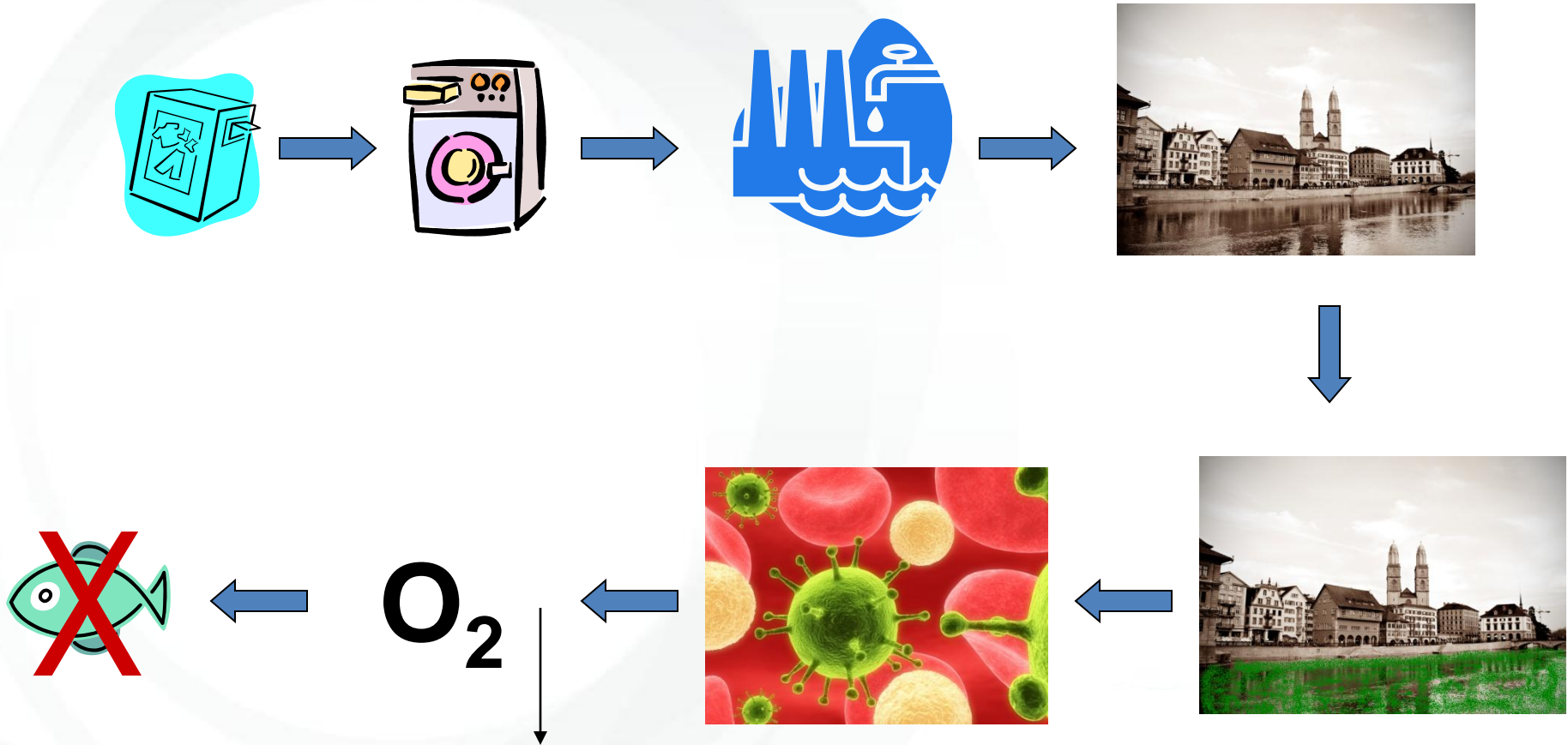


# Positively, phosphates...

- Function as excellent builders within the detergent formulation, giving threshold level performance.
- Allow for acceptable levels of cleaning at a controlled (safer) pH.
- Help suspend certain types of particulate matter.
- Aid in killing germs.
- Are cost effective.
- Are environmentally benign except...



# However, phosphates also contribute to eutrophication



# Chronology of phosphate regulation

- 1960's – In an attempt to get away from phosphate in laundry detergents the industry pours hundreds of millions of dollars into NTA research as a potential phosphate replacement.
- Late 1960's – Lake and waterway deterioration becomes a particular public concern.
- 1970 – The detergent industry voluntarily agrees to reduce laundry detergent phosphorous concentrations to 8.7%.
- 1971 – Under concerns of carcinogenicity of NTA, the Surgeon General “requests” the industry discontinue its use.
- 1970's and 80's – a number of states and municipalities pass legislation completely banning NTA and/or phosphate from laundry detergents.
- 1980 – EPA declares NTA's cancer risk of 2 in 1,000,000 too small to pursue federal regulatory action.
- 2008 – some municipalities ban the use of phosphate in automatic dish detergents.
- 2010 – many states ban the use of phosphate in automatic dish detergents.



# Why can't phosphate just be swapped out with something else?

- Short answer: because nothing exists that does everything phosphate can do in a formulation.
- What about novel chemical compounds?
  - TSCA takes time and money
  - NTA example for Laundry
- So we're left with exploring combinations and trying to balance the positive and negative effects (example: increased alkalinity will aid in cleaning but becomes less safe).



# Primary items industry must consider

- Safety
- Performance





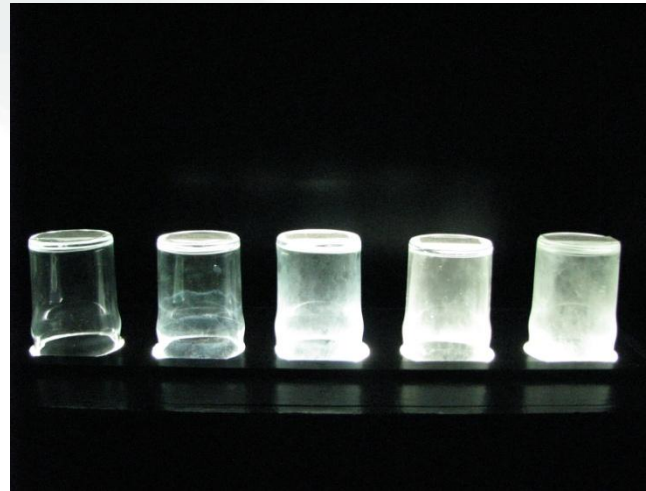
# Primary items industry must consider: Safety

- Environmental safety
  - Eutrophication
  - Biodegradability
  - Effects of by-products
  - Mobilization of heavy metals
- Product use safety
- Product misuse safety
- Industrial safety



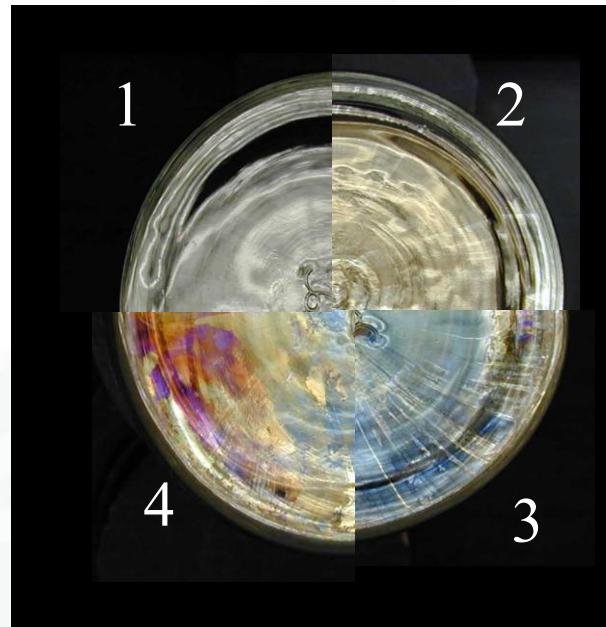
# Primary items industry must consider: Performance

- General Cleaning
- Spotting/filming
- Prevention of etching



**unwashed**

**rainbow hue  
chords with  
heavy filming**



**yellow tint  
chords**

**blue tint  
chords**

# Additional items industry must consider

- Compatibility with machines



- Compatibility with dishware
- Product shelf life and package compatibility
- Process-ability
- Cost

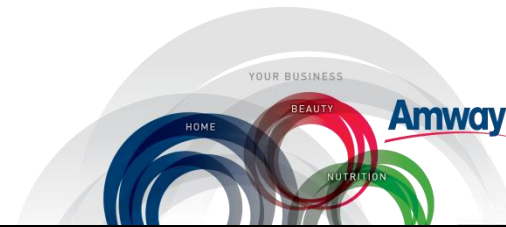
# What Amway did: A historical perspective

- In the early 70's Amway offered three automatic dish detergent formulas:
  - A high phosphorus, low recommended use product
  - An 8.3% P formula to fit certain municipality regulations
  - A zero P formula marketed only for users with soft water
- In the late 70's, additional regulations forced the elimination of the high P formula.
- In the early 2000's SKU consolidation forced the elimination of the zero P formula.
- In 2006, a multi-year research project was initiated to formulate a new, globally acceptable phosphate free formula.
- In Oct, 2008, Amway's first phosphate free formula that performed well in hard water was launched in the U.S.
- In April, 2011 this same formula was launched across Europe.
- In 2012 this same formula will be launched in Japan.



# What Amway did: Developing a P-free formula

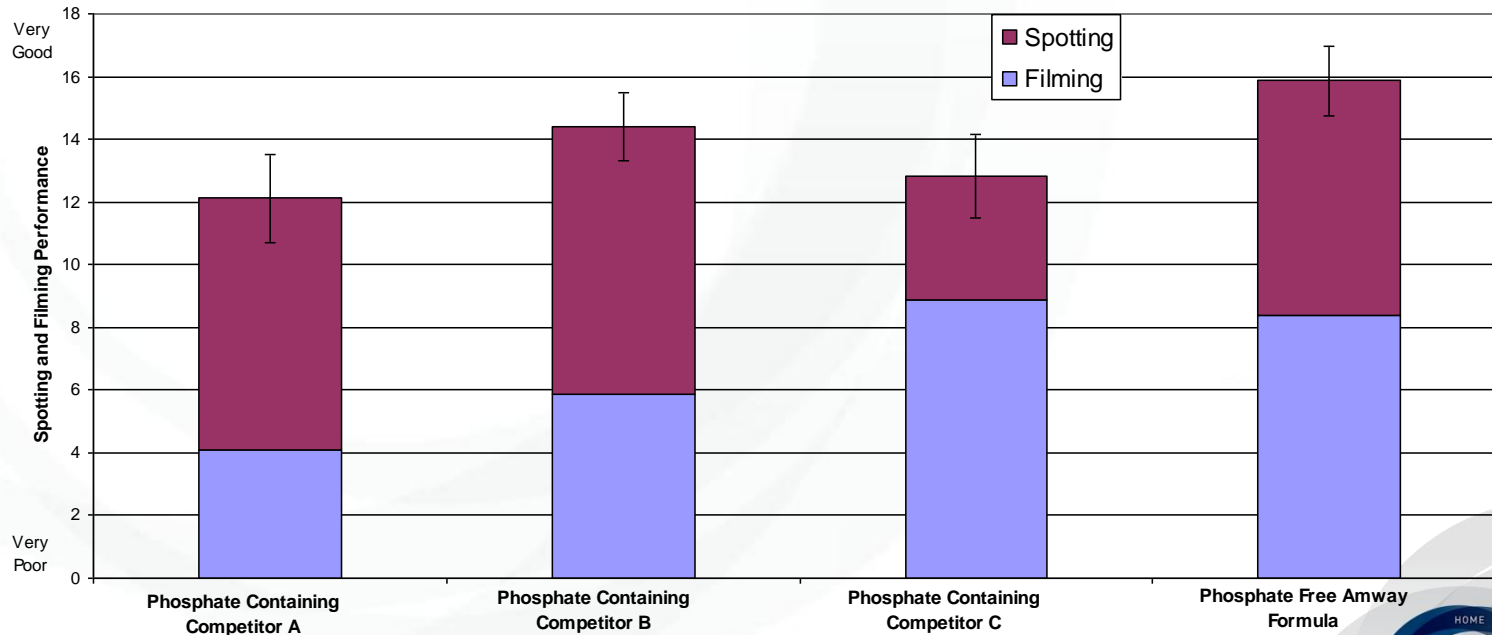
- From a formulation perspective (very generally)
  - Removed phosphate...
  - And increased/added:
    - Alkalinity
    - Sodium citrate (weak builder)
    - Nonionic surfactant
    - Additional protease
    - A novel biodegradable crystal inhibitor



# What Amway did: Developing a P-free formula

- Searched for novel compounds that could potentially deliver similar chemistry
- Looked for synergies between ingredients
- Screened hundreds of possible formulations for hard water performance

Five Cycle Hard Water (15 grain) Automatic Dish Detergent Performance



# What Amway did: Developing a P-free formula

- Confirmed full formula biodegradability (OECD 301A) at a third party lab
- Had the formula recognized by the U.S. EPA for formulating using chemistry that is “safer for you and the planet”



Recognized for Safer Chemistry  
[www.epa.gov/dfe](http://www.epa.gov/dfe)

- Performed extensive in-home use tests in both U.S. and Russian markets
- Developed a method and tested for microbe removal from dishware
- ... Then, finally launched a formula that saw only slight revenue growth and (unfortunately) a slight increase in consumer complaints



# Conclusions

- Not all phosphate based products are created equal.
- We have an economic incentive to continue to move towards more safe, more “green” consumer goods.
- There usually is no such thing as a “simple” swap.
- We can usually get there (or close) but it takes time and frequently new molecules from external primary research.





# Thank You!

